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【808】Tailored error correction codes for spin qubits: towards fault-tolerant quantum computing with semiconductor quantum dots

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Recent spin-qubit experiments demonstrate gate operations and readout well within 1% error rate. This is the error threshold of the surface code assuming that gate errors, measurement errors, and data qubit errors occur with the same probability. Recent developments in error correction codes present opportunities to improve the threshold and reduce connectivity requirements compared to Kitaev's surface code. In this work, we consider state-of-the-art error correction codes and study their performance under anisotropic circuit-level noise that accounts for distinct error rates for gates, measurement and qubit decoherence during idling. We present the spin-qubit layout required for each of the error correction codes, accounting for additional elements required by spin-qubit architectures.

Theoretical Work

Theory

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